Commission on the History, Philosophy and Sociology of Soil Science
International Union of Soil Sciences
and
Council on the History, Philosophy and Sociology of Soil Science
Soil Science Society of America

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Newsletter

Contents

Submissions always welcomed

Editor's Note

This issue of the newsletter is focused on the Soil Science Society of America meetings in Indianapolis, Indiana USA in November 2006 and New Orleans, Louisiana USA in November 2007. It is the (delayed) second 2007 newsletter, following the March 2007 newsletter that focused on the 2006 World Congress of Soil Science.

For anyone who is looking to contact me, please note that I have changed institutions (the reason for the delay of this newsletter getting out). New email and postage addresses are given for me at the end of the newsletter.

Any and all submissions for future newsletters are welcomed! These may include short articles, book reviews, and news items. Please send such materials to Eric Brevik at Eric.Brevik@dsu.nodak.edu.

Soil History Website

Eric Brevik is also maintaining a history of soil science website for S205.1 – Council on the History, Philosophy, and Sociology of Soil Science of SSSA. Due to Eric's move, the website is no longer being updated at its former site on the Valdosta State University server, although it is still accessible if anyone wants to use the resources provided on the site. The old website address is http://chiron.valdosta.edu/ecbrevik/HistoryMainPage.htm. We are in the process of moving the website materials over to a SSSA server. That move is not yet complete, but details on the new web address will be sent out when it is ready.

Articles

History and Soil Science - a discussion

Richard W. Unger
University of British Columbia

At the annual meeting of the SSSA in Seattle in November, 2004, at the end of a day of varied and interesting papers which covered many aspects of the history of soil science from many different angles, there was a general discussion of how soil scientists and historians might work together to expand and improve work in the field. Ed Landa, who organized the highly successful sessions, asked me to join a panel made up of some of us who had given papers in the sessions, to make some opening remarks and also to chair the discussion. Members of the panel offered comments and fielded questions as well as responded to observations from the audience. Only constraints of time limited what was a free-ranging and productive discussion which explored both general issues faced by the field as well as concrete suggestions for improvement of work on the history of soil science. The exchange was placed in the context of present practice, present expectations, and present constraints. What followed was an examination of how to reach beyond those constraints.

Historians look to the history of science, and the history of medicine as well, to contribute to the understanding of historical change. As an exercise in intellectual history the changing character of ideas can give some sense of the climate in which decisions have been made. At the same time historians intend that their study of the history of science should help scientists in understanding what they are doing, how they arrived at the set of questions they ask, what the methods of answering them might be, and, in general, how to approach their work. The hope is that knowing more about history will help not only in research but also in teaching, with historical background being a way to draw students into a better understanding of what they must deal with to become effective scientists. Doing the history of science requires, at a minimum, two extensive sets of skills and it is rare to find anyone with an equal balance in talents and training. The result is that history of science done by those with training in science, like history of science done by those with only historical training, is found wanting by those on the other side of the spectrum of the requisite knowledge and background. For historians, there is a fear that the history produced by scientists, and that would include soil scientists, will be condescending or patronizing. Concentration will be on what can be sometimes arcane knowledge, well known to people working in the field, almost assuming that everyone no matter their background will recognize what is important. There may be too much emphasis on the science with little space left for the context. The work can be too internalized, dealing only with scientists, their ideas and their own work. There can as well be a fear of overgeneralization, of forcing unique events which emerged from highly specific circumstances into some grander pattern. Too, there can be a fear of overemphasis in the wrong place. On the other hand for soil scientists the history of science done by historians can appear to be naive and even inaccurate because of a lack of knowledge of the science. It can be highly limited for the same reason but also suffer from grand claims based on weak evidential foundations and from a lack of understanding of the way soil scientists have worked.

The session in Seattle showed that those with a background in soil science are keenly aware of the need to bridge the gap with historians and to eradicate those shortcomings in practices in the field. At the same time historians, authors working in various aspects of the rapidly developing field of environmental history, have recently expressed similar concerns and have called for more energetic pursuit of the study of the history of soils and of soil science. Peregrine Horden and Nicholas Purcell in what has become in a short time a classic of environmental history pointed out that: "Fertility, productive opportunity, and the soil itself are all of human construction…. There is no absolute quality of land anywhere: its value and potential depend on the choices and perceptions of those who make use of it."1 While economic historians, especially those of the *Annales* school of the mid twentieth century, tended to take nature and the ways people dealt with their natural surroundings as static over the long term, now the predominant view is that humans are actively involved with their environments, changing them, learning about them and adjusting to them both in the short and the long term. One tendency, in part perhaps in reaction to earlier scholarship like that of the justly famous French historian of the early modern economy, Fernand Braudel, who took on a number of centuries at once, has been to deal very much in the short term when talking about the history of soil science. That myopia is not limited to scientists practicing history. No one examining questions to do with the history of soils and of soil science should lose track of trends and changes over the course of centuries and even millennia. That broad expanse of the past needs to be kept in mind, no matter how specific any research may be. Historians will then get the sense that they need to know more about soils and one direct result is that they will be more interested in what soil scientists have to offer for the study of the history of the environment.

There has always been potential for interaction between the study of soil science and the study of history. Recent developments on a number of fronts suggest that there is more potential now that possibly at any time in the past. For soil scientists finding the time to do history is difficult since they often take up such work only after fulfilling extensive obligations in what is their primary profession. In some cases soil scientists are forced to wait until they retire before they attack the study of the past. The delay to later in life is unfortunate since necessity creates the wrong impression about the value of work on the history of soil science and perhaps an incorrect impression about its practitioners. At least there is the advantage that those who come to the job in retirement generally have extensive knowledge of soil science and also enjoy mature judgement. When they do find the time, however, the task can be daunting since they need exposure to a broader range of study, they need to learn about the context of events, and to develop a new range of methods and approaches. They also find themselves with an extremely minor role in a much larger process, something they may have come to understand in the context of their work as scientists - adding building blocks to a large edifice of knowledge - but difficult to comprehend in what for them is a novel discipline. Soil scientists must be willing not only to be concerned with the past of their own profession but also to exploit the growing interest in environmental history with all of its own twists and turns created by political pressures as well as new findings. Historians learning to examine the past of soil science typically do have the advantage of being able to devote more time to the enterprise. Often their greatest difficulty is that they simply are unaware of the existence of a separate and thriving study of soils, both from the late nineteenth century on when Russian scholars laid a scientific basis for the field and from the centuries before that transformation when the study and discussions of soils took many forms, not always easily recognizable as early soil science. The most difficult task for historians is adding soil science to the long list of extensive, intimidating, massive, and varied sources of knowledge and information which they need to and want to incorporate into their understanding of the past. Here and there cases exist of historians making an effort to exploit scientific findings, with work on tree rings and on soil erosion serving as examples. The latter has the problem of being the study not of soil but rather about soil that is gone and historians typically stop there. Perhaps they should take more interest in the composition of soils that have been lost and also in the soils which remain. It is another instance where the study of the history of soils and of soil science has remained peripheral, oddly even in the study environmental history. Historians are perhaps simply overwhelmed and have too many other pressures on them to include yet another body of unfamiliar and complex information.

Historians at least acknowledge that they have been guilty of oversight. In a recent summary of the state of environmental history the prominent American scholar, John R. McNeill, wrote: "…there are some other dark islands for historians to explore. One is soils history. It seems curious that the earth itself should not absorb much attention from environmental historians. They have sometimes focused on soil erosion, but the history of soils requires much more than that. The chemistry and biology of soil fertility is always changing, partly due to human activity, and it always affects human prospects, wherever farming is pursued."2 The study of soils and the use of soil science to understand what people have done with soils over the centuries can and should be part of global history, a burgeoning branch of the discipline and one, like soils, that does not know national boundaries. In order to carry out such work it is necessary, and especially but by no means exclusively for any work on the last century and a half, to understand what happened in soil science. There is a contribution to be made by students of the history of soil science to global history, an the consciousness of that contribution should only grow in the future. That is all the more reason that both historians and soil scientists, historians working on soil science and soil scientists working on history, should make every effort to cooperate and, in the first instance, to find out about the other.

Concrete suggestions put forward in the discussion at Seattle included the development of teams of historians and soil scientists to carry out projects on environmental history. The groups could share problems with sources, problems which all parties have. One example offered in the discussion was archeology which produces information of value to those working on the history of land use and the history of how people understood soils and soil use. The data from archeology needs interpretation, however, and that can be enhanced for both historians and soil scientists when then know what the others think about the data. Historians should share their analytical methods with soil scientists and do so not only in person but also in print. Individuals from both sides of the divide should make efforts to publish in media designed for the other. Among historical journals *Agricultural History*, *Environmental History*, and *Technology and Culture*, are outlets that in the past have been receptive to works about soil science and which might reach a wide audience of historians. Editors of journals of soil science have, apparently, in the past expressed a willingness to publish papers on history. One danger from such crossing over is that the discourse is different in historical versus scientific publications and scholars on both sides will have to be willing to put aside their expectations about how things ought to be written. Language is a barrier and only through exposure to different forms and patterns of expression will the barrier be bridged. Some of the differences are obvious - historians typically write longer pieces than soil scientists - but just because the format is not the same should not, despite what often happens, lead to condemnation of a piece of work. Not only are there differences in presentation but also differences in the reading of texts. That barrier is harder to bridge. What a soil scientist gets from an agronomy text, for example, is not what an historian finds. Both approaches have their value but practitioners of the two approaches should be aware of the methods of both and try to exploit the advantages of both. Journals are one way for both sides to explore the discourse of each other and increasingly web sites may well serve that purpose and, indeed, one of the functions of the web site of the Council on History, Philosophy

& Sociology of Soil Science is to give access to a broader public to work on the history of soil science. Through links to H-net, probably the most commonly visited web portal for historians, it should be possible to open the eyes of historians to work being done on the past of soil science.

A massive study encompassing all of the past of soil science is simply not possible at the moment. It may never be possible. The only way such a synthetic work will ever come to light is if there is a series of specific studies on different regions and different periods and on different individuals who have been influential in the development of soil science. The only way such specific studies will be possible is through the preservation of information. It is necessary that material is saved, that archivists are made aware of the value of relevant materials and that archives keep and make them available to researchers. That is a first responsibility of anyone interested in the history of soil science. There was a lively discussion of one aspect of preserving knowledge: the use of oral history. While everyone was conscious of the value of eye witness accounts and of the danger that many participants in the practice of soil science in the twentieth century will soon no longer be able to report what they saw, at the same time it was agreed that simply going and recording statements was not enough. Those doing oral history need to understand what they are doing, they need to be aware of the pitfalls, both scholarly and legal. Best practices have been considered and discussed by those who have done oral history and considered by professional organizations such as the American Historical Association. Those discussions can serve as guidelines for anyone undertaking that type of research. Since in some cases there may be legal implications, in matters to do with the environment or of government enforcement practices for example, it was urged that anyone embarking on an oral history project be careful and be conscious of the problems.

Practitioners, no matter their starting point, need at this stage to amass a body of information with synthetic works to follow, that is in the form first of collections of papers and then of monographs. The tendency and temptation to theorize should be avoided or at least excessive theorizing should be avoided. Simple story telling is not enough and never enough in the writing of history but at this point it is of great value. While biography may not be history it does have its function and does offer building blocks for larger studies. Individuals can and do have deep influence on the development of science but at the same time anyone doing research must be cognizant of the role of institutions in shaping thoughts and actions of individuals. Extensive literature on the sociology of science has seemingly not been able to assess the extent of those influences but at least people working on such issues have identified many of the parameters. It is necessary to identify what is a good story, what is the valuable description that will advance understanding of the history of soil science. The only way to do that is through experiment, through efforts on the part of interested parties, and the sharing of experiments in public and private forums. Cooperation will yield positive results and though results may be slow in coming and though a good deal of patience may be required, the outcome will be beneficial for both historians and for soil scientists. There should be no doubt about the significance of the enterprise and soil scientists should not see themselves as merely dabbling in history. As cultural ecology, the study of how common human conditions shape the relationship of people to the environment, moves inexorably toward political ecology, the study of how conditions of power shape the relationship of people to the environment, as it must, then soil scientists will find themselves drawn into doing history. And for all those soil scientists who teach, the ability to exploit history will make their task easier and make their students both better informed and more interested in the exercise. Perhaps the most concrete and immediate recommendation to emerge from the panel and from the audience was for all those with any interest in soil science, no matter their background, to talk to each other. Informal exchanges of information, seeming perhaps to be nothing more than gossip about work and about people, will serve to break down barriers that separate the disciplines and lead to better understanding on the part of everyone of what needs to be done and how it can be done. The recommendation may seem a simple one but the great advantage of that simplicity is that individuals may well be in a position to take it up and so lay the groundwork for ever greater cooperation in the future.

The discussion in Seattle was wide ranging. Connections between the different topics and areas considered were not always obvious. There was a sense of a range of barriers around researchers with challenges, including among many others archival problems, which each posed its own difficulties and called for its own solution. Time was short at the end of a long and fruitful day and members of the panel and audience had to leave to meet deadlines. Contributions from panel members had to be brief. In this short summary it is not possible to do justice to all opinions expressed. Certainly there was not the time to address each issue identified in studying the history of soil science which came up in the course of the day and more specifically that came up in the course of the discussion. No one of us was able or, more precisely, was willing to try to generate some over-arching conclusions about where the history of soil science is, where it is going, and how all of us can make sure it arrives at the destination quickly and in good condition. There was a call from almost everyone to internalize knowledge, to take seriously the study of soils and the history of soil science, but not to make such study just internal to the field and not just the study of what practicing soil scientists did . Rather the call was for an openness to different approaches, to new ideas and new methods, to writing in an accessible way to a wide audience that spans disciplines, and above all to share what is known and ways of gaining new knowledge. That openness will make the task of identifying the course for the history of soil science more difficult but will make the exercise all the more fascinating. There was universal agreement on one point: all of us were grateful to Ed Landa for organizing the discussion session.

1. P. Horden and N. Purcell, *The Corrupting Sea A Study of Mediterranean History*. Oxford, 2000, 231.
2. J. R. McNeill, "Observations on the Nature and Culture of Environmental History," *History and Theory* 42 (Dec., 2003), 41.

Questionnaire: Soil, Art, and Aesthetics

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At the German Soil Science meeting in September 2007 in Dresden, we presented results of a "study project" held for land planning students. "Study project" means a special seminar in which about 20 students develop their own ideas and realize them within two semesters. The topic was developing Soil Art on brownfields. Some of these students' ideas were presented on the occasion of the traditional Berlin science exhibition, called "long night of Science". This is a public demonstration of various scientific concepts and ideas presented once per year by the three Universities of Berlin and most federal scientific institutions.

At the Dresden meeting I presented some of these students' concepts and I made an inquiry into the interaction of soil and art and aesthetics. I distributed a ten questions survey. After my talk and the discussion I got back answers from 59 people.

The aim of Question 1 was to find out which major aspect (natural science, social science or aesthetics) or which combination of them is relevant for soil (Figure 1). As expected natural science is still the major aspect under which soil is regarded by soil scientists. But surprisingly, aesthetics was higher ranked than social science. Also the combination of both natural science and aesthetics got slightly more votes than the combination of social science with natural science.

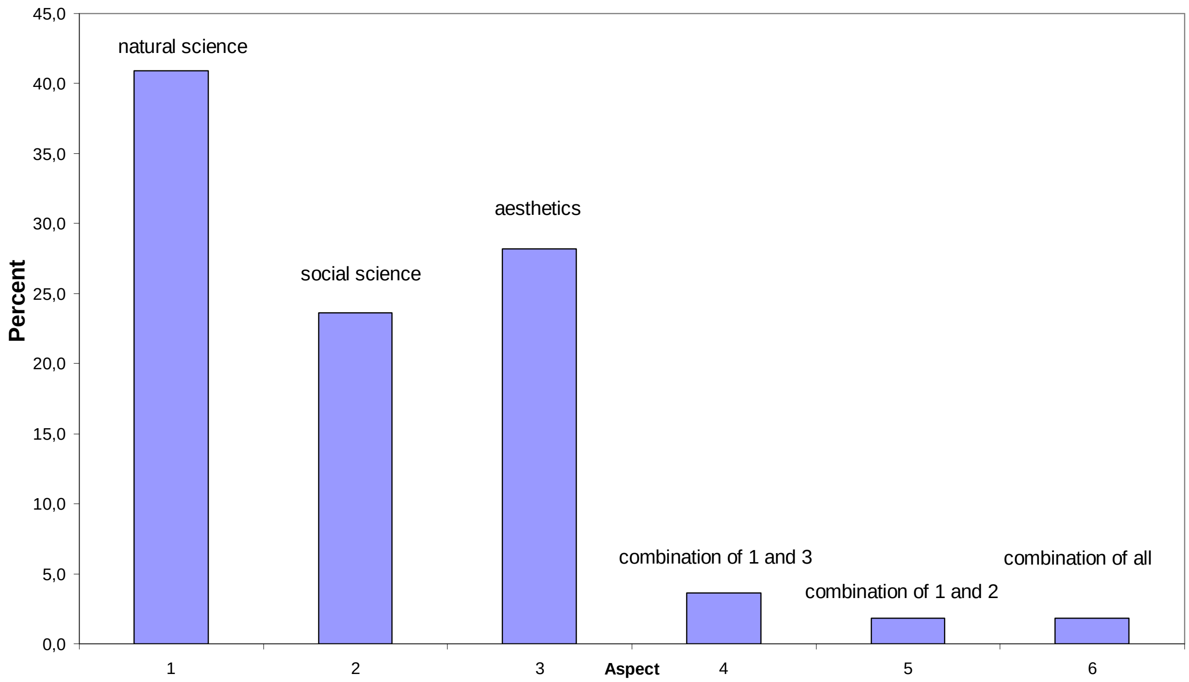


Figure 1: Results from the question: "Which aspects are relevant for soil?"

With Question 2 we tried to find out whether our profession as soil scientists also includes aesthetic elements. People could decide between "yes", "sometimes", and "no".

The fact that 15% of the scientists voted "yes" and 49% "sometimes" corresponds well to the results of Question 1 and demonstrates again that aesthetics is an evident element of our work (Figure 2). If this interpretation is right the obvious questions are allowed, "why the soil science societies don't, and we as members do not talk more about aesthetics" and "why do we not use that connection as a tool for demonstrating soil science relevance"?

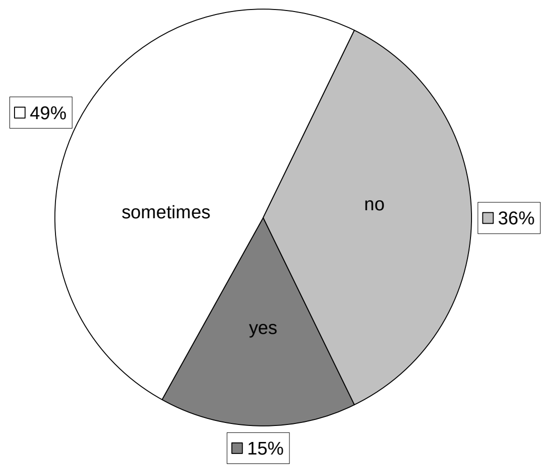


Figure 2: Results from the question: “Does your profession include aesthetic elements?”

For Question 3 the reader of this paper should know that we, (Toland and Wessolek) have put great effort into developing soil and art projects, seeking to make it more popular in the soil science community. Question 3 provides first feed back about the relevance of Soil Art (Figure 3).

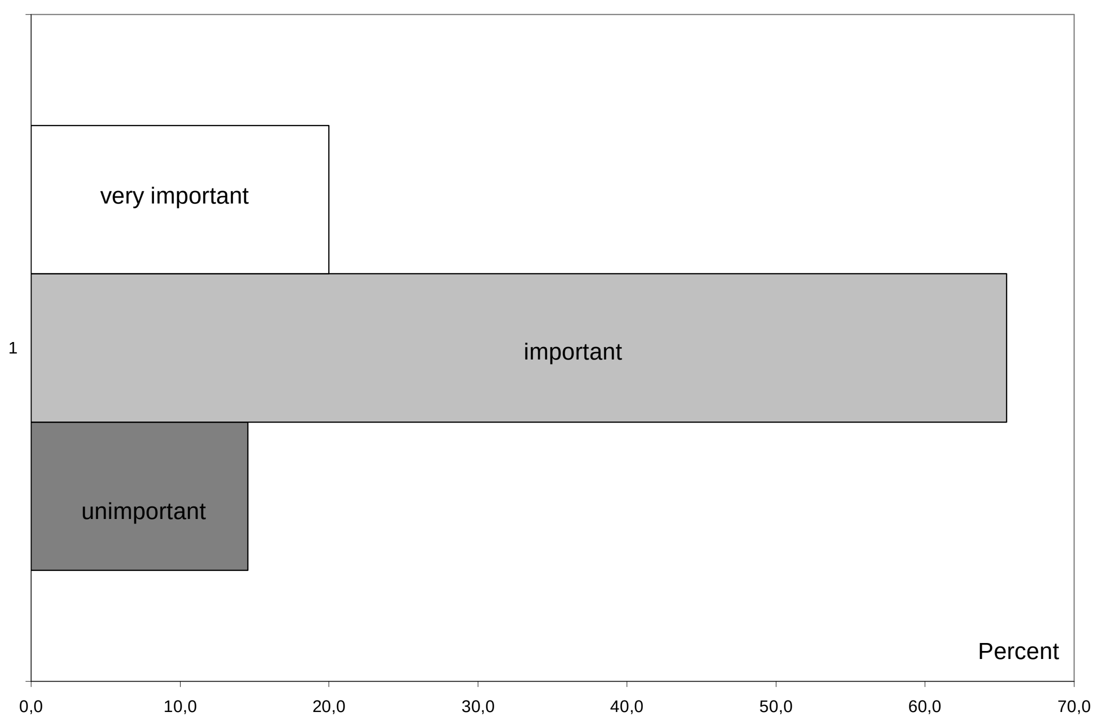


Figure 3: Results from the question: “Is Soil Art important?”

While about 64% voted for important and 20% for very important, only 16% felt that Soil and Art are not mutually relevant. It is interesting to see that this opinion is age dependent. Young soil scientists (<35 years) are not as convinced of a Soil and Art connection as the elder ones are. May be they do not see it as career relevant?

Sometimes it is very difficult to get personal information or answers about aesthetics, so we did it indirectly by asking about the motivation of scientists in typical situations. We all know that soil scientists' work has more or less to do with soil samples, so we asked if they collect them or stones for aesthetic reasons (Figure 4).

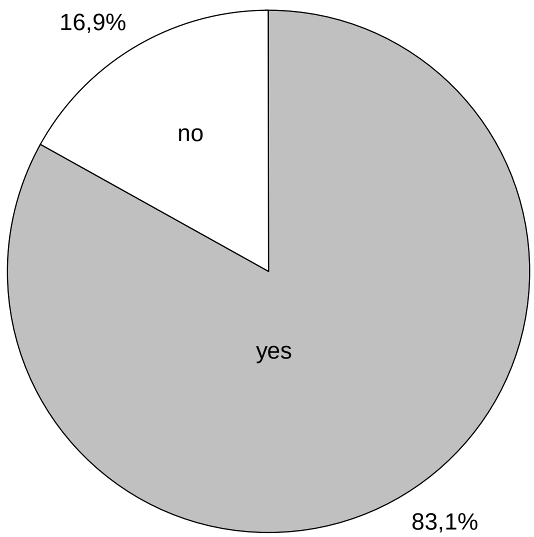


Figure 4: Results from the question: "Do you collect soil or stones for aesthetic reasons?"

More than 80% do - a verification of questions 1 and 3. This led us to the question "which of the soil properties can be seen as most attractive". People could choose between the aesthetic qualities of texture, structure, colour, smell and soil horizon. Figure 5 shows the soil scientists' favourites.

It does not really surprise us that colour is the most frequently mentioned aesthetic quality. But it is interesting that soil structure has obviously a higher aesthetic value than soil texture. This means differences between the sand, silt, and clay fractions become small compared to the higher organized and complex soil aggregates which can be seen as small abstract sculptures. However, the smell of soil is not a relevant aesthetic quality for most respondents.

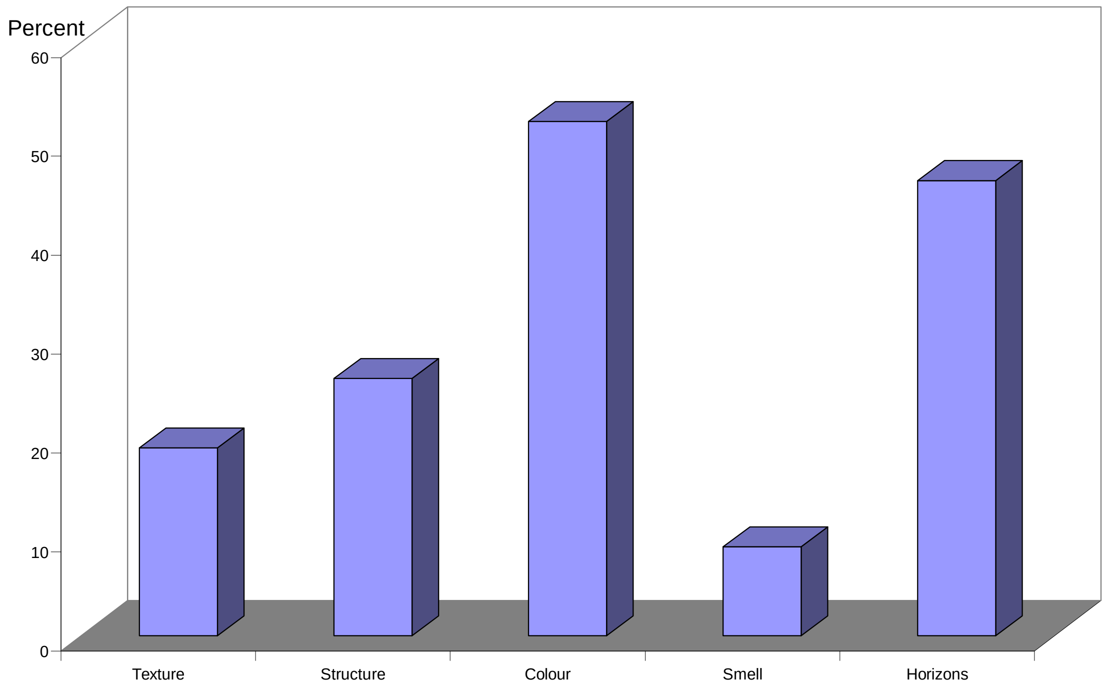


Figure 5: Results from the question: “Which soil properties have high aesthetic value?”

With the next question we try to find out when and where soil scientists notice soil aesthetic values. Respondents could select any or all possibilities (Figure 6).

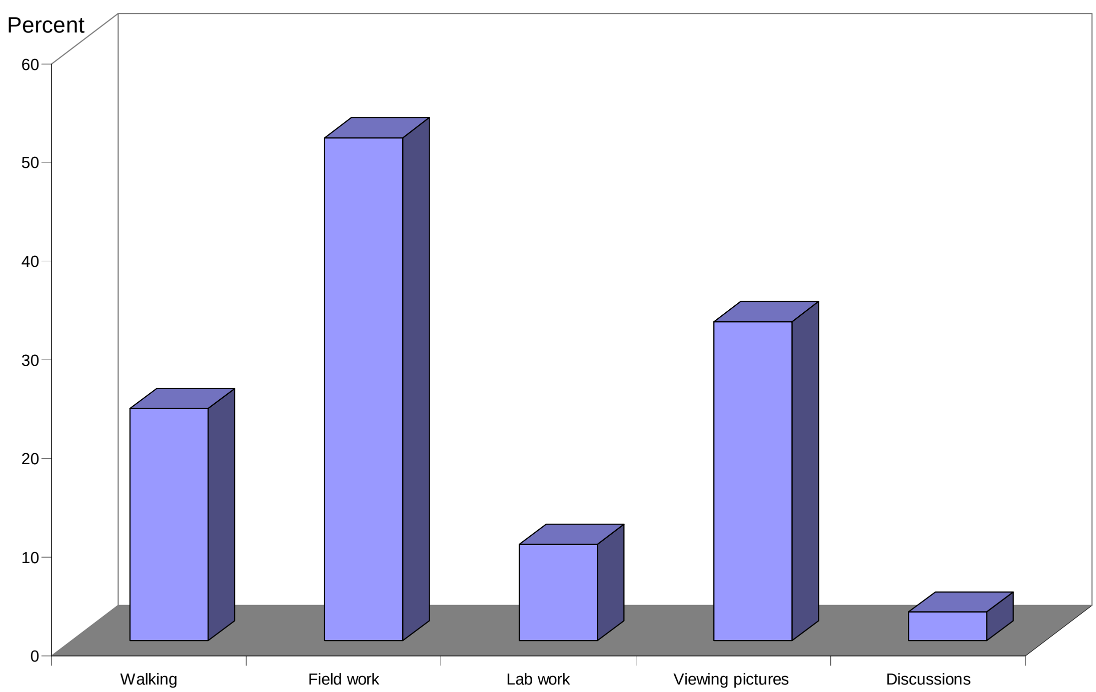


Figure 6: Results from the question: “When do you notice aesthetic values of soils?”

Nearly 50% of the soil scientists have the opinion that field work is the central occasion for getting aesthetic experiences of soil, followed by viewing pictures and walking. It surprised us that even 8% combine laboratory activities with aesthetic elements. Maybe lab work has still some contemplative elements which allow discovering soil colour, structure and so on.

With the next question we tried to found out whether various soil types have different aesthetic values. We already know from Question 6 that field work is the most probable way to have aesthetic experiences about soil. Consequently we picked some typical and relatively well known soil types and asked which of them are appealing and which are not (Figure 7).

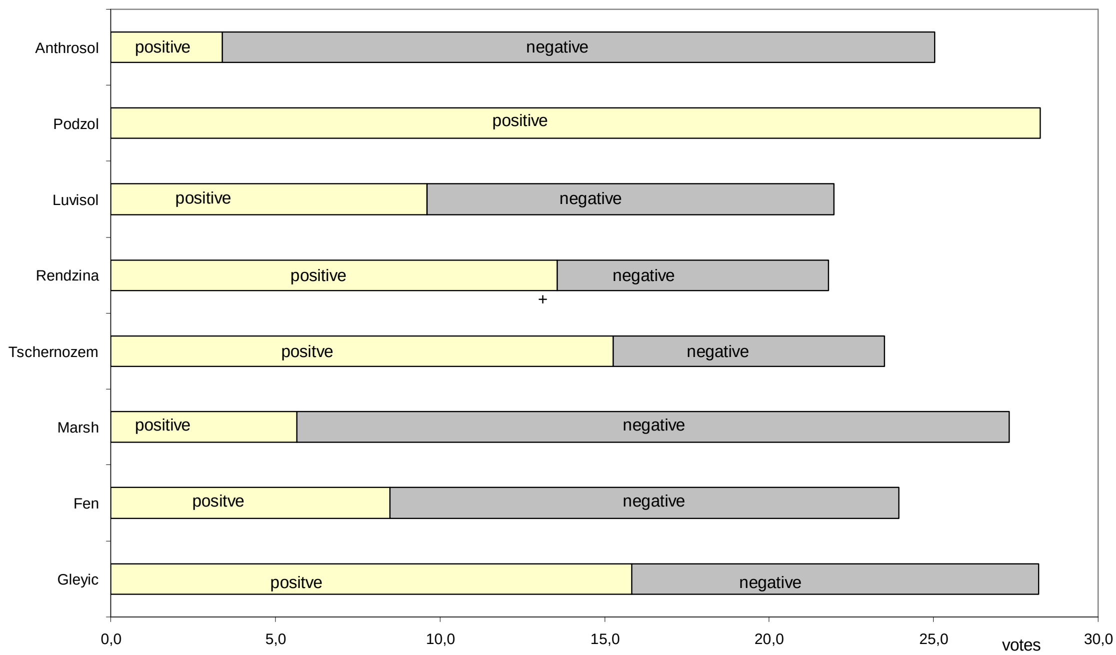


Figure 7: Results to the question: “Which soil types do you like, and which ones not?”

Without a doubt Podzol is the most attractive soil type of all (no negative votes). This is probably caused by its amazing color and beautiful sequence of soil horizons. In all other cases we found both positive and negative reactions for each soil type. A Tschnozem for example is an attractive soil type for about 60% of soil scientists while 40% do not agree. Gleyic soils have nearly the same amount of positive votes but on the other hand they also got many “negative” reactions. In general wet soils got more negative votes than dry soils. Anthropogenic soils and wetland soils (marsh, fen) got the most negative votes of all. They are disturbed (anthropogenic) or wet (marsh, fen). In some cases people believe that anthropogenic soils are of great interest because of their history and human impact.

This statement was investigated with the next question: We asked if anthropogenic factors change the aesthetic value or not. Three answers were possible: “decrease”, “increase” or “it depends” (Figure 8).

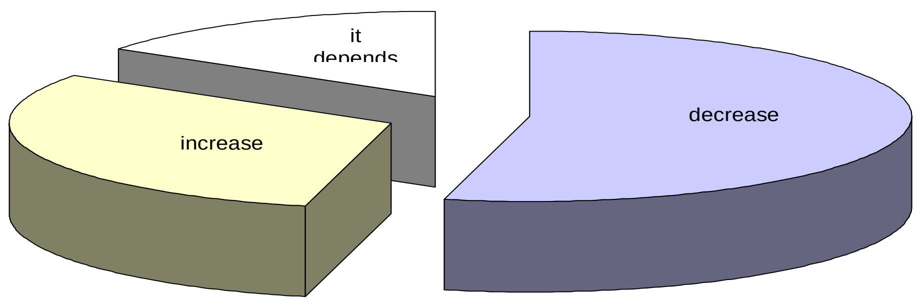


Figure 8: Results from the question: “Do anthropogenic factors change a soil aesthetic value?“

In most cases people have the opinion that anthropogenic factors decrease the aesthetic value of a soil. This means at least that human activity seems to have a negative impact upon the soil aesthetic values.

In the last question dealing with aesthetic values we asked for their personal interest in cooperating with an artist (Figure 9).

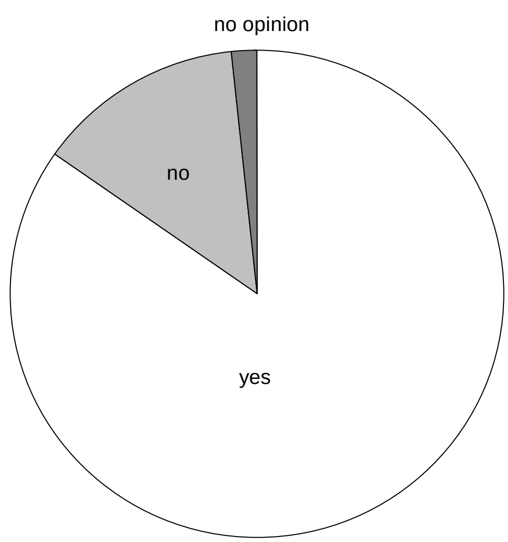


Figure 9: Answers from the question: “Could you imagine cooperating with an artist?”

About 85% answered it positive, 14% negative and some did not have an opinion. This again is a clear indicator for the great aesthetic interest of soil scientists. The interpretation might be that many soil scientists would like to develop their interest in soil and art but need at least the help of artists.

The last question describes the ages of the responding scientists (Figure 10).

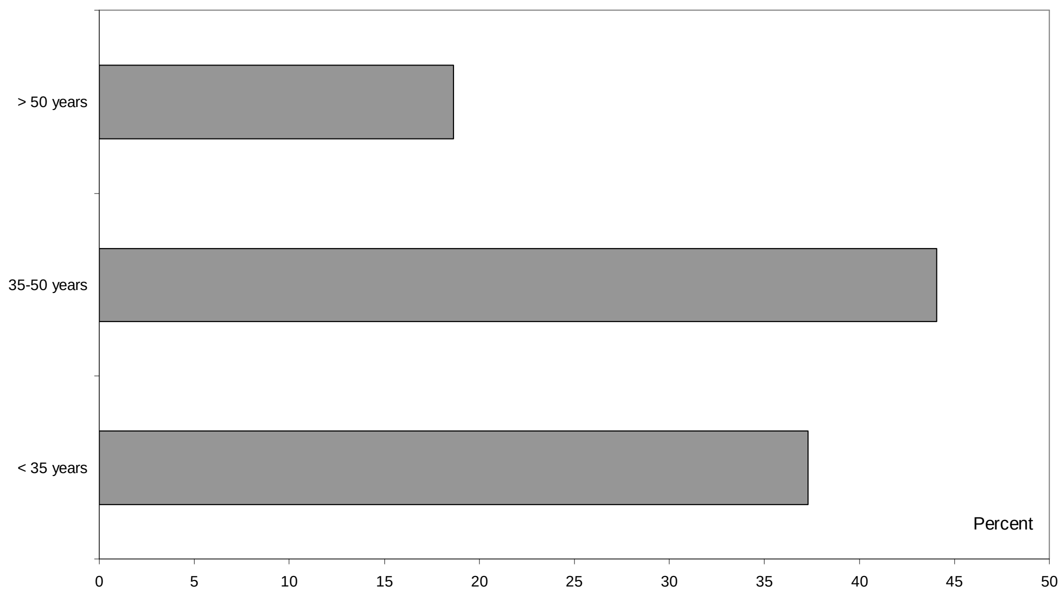


Figure 10: Answers to the question: “How old are you?”

Middle aged scientists (35-50 years) were most common (44%) followed by the young people (<35 years old) with 38%. Older scientists were about 18%. In only a few cases we tried to find out whether answers to a given question were influenced by the age of the scientists (for example Question 3). Because of an unequal age distribution and a small “N” we avoided making more age dependent analyses.

Conclusions

It seems to us that soil scientists are much more interested in soil art and aesthetic values than we perceived. Yes, it’s true, soil scientific work in its ordinary form has nearly nothing to do with art and aesthetical values. Nevertheless, the questionnaire shows us how strong our work is involved emotionally with aesthetical values. Until today, most of us neglect more or less these interactions, maybe because we are afraid of getting an unscientific reputation or being seen as unserious.

We suggest use of these interactions in a more positive way. Use both, art and aesthetics, for our soil science discipline. Using them as a tool, it becomes much easier discovering and explaining soil beauties and their landscape functions and of course, ways to protect them. This is not easy to do. So let’s start to cooperate with professional artists, invite them to excursions or on scientific meetings. They do their job as professionally as we do.

2007 SSSA Symposia

The SSSA Council on the History, Philosophy, and Sociology of Soil Science sponsored two symposia at the 2007 SSSA meetings in New Orleans. The first was titled “Soil Science and Scientists in the Early History of ASA” and was held in honor of the 100th Anniversary of the American Society of Agronomy. The second was “Soils and Civilizations”, a session we felt was appropriate given the location of the meetings.

Abstracts from the symposia are published below. Many of these presentations were recorded, and will be accessible off the SSSA website in the near future by going to https://www.acsmeetings.org/about/future-and-past-meetings/sssa-asa-cssa/

Soil Science and Scientists in the Early History of ASA Session - Thomas Sauer Presiding

The Dust Bowl's Prairie States Forestry Project: Model for an Effective Global Climate Change Strategy? - Thomas Sauer

Persistent drought, poor soil management, and subsequent wind erosion in the Great Plains during the 1930's had far-reaching social, economic, and environmental consequences. In the midst of the Depression, the federal government developed several programs in response to dire conditions in six of the most severely-affected “Dust Bowl” states. Overcoming significant political obstacles and resource limitations, one of these programs, the Prairie States Forestry Project (PSFP), would eventually plant over 217 million trees in 18,600 miles of shelterbelts in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Viewed by modern standards, the PSFP was conceived, designed, and implemented in an astonishingly short period of time. A critical element of the PSFP success was the keen interest and at times direct involvement of President Roosevelt. FDR took a strong personal interest in the success of the PSFP, which likely encouraged line managers to devote special attention to the project. Many factors regarding seedling selection, site preparation, and planting techniques, however, were developed at the lowest levels within the PSFP. Thus, simultaneous top-down and bottoms-up management styles were used with remarkable effectiveness. Even today, the federal response to the Dust Bowl, including the PSFP and creation of the Soil Erosion Service, represents the largest and most-focused effort of the government to address an environmental problem. Although climate change is much more complex and a global phenomena, there may be important lessons from the PSFP experience. Jared Diamond's 2005 bestselling book “Collapse – How societies choose to fail or succeed” discusses the decision-making processes used by societies to address negative impacts of environmental degradation. The PSFP fits the profile of a successful decision-making process. The challenge lies ahead to engage similar successful decision-making in crafting effective policies and programs for addressing climate change issues.

George Nelson Coffey: ASA's Second President - Eric C. Brevik

George Nelson Coffey is widely renowned in soil science as an innovative thinker who was ahead of his time. Coffey was also the second president of the American Society of Agronomy, serving in that office in 1909. Coffey was nominated for the ASA presidency by the noted soil fertility expert C.C. Hopkins. Coffey gave presentations at the early ASA meetings that clearly showed the innovated nature of his ideas on soils. Coffey's first documented attempt to introduce aspects of Dokuchaiev's work in soils into American soil science was at the Ithaca meeting in 1908; Hilgard's influence on Coffey's thinking is also noted in this presentation. In his presentation Coffey argued that, among other things, mineralogical composition, topography, and native vegetation must all be considered in soil classification. He also stated that climate influenced soil formation, and that too much emphasis had been put on geology alone. This is three years before the publication of Bulletin 85, the source most commonly associated with Coffey's attempts to introduce Russian ideas to American soil scientists, and more than a decade before Marbut's attempts at the same in the 1920s. In his presidential address to the Omaha meeting in 1909, Coffey focused on the value of studying soils in the field. In this talk, Coffey argued that the properties of the soil needed to be considered when crop yield tests were conducted. Apparently, the standard practice of the time was to largely ignore soils and focus on climate when conducting yield tests. Coffey also argued forcefully against getting too focused on analysis of soils in the lab, stressing that an understanding of soils in their natural state was important; a debate that rages to this day in our field. These early ASA presentations by Coffey will be explored in detail.

The Presidency of the American Society of Agronomy: Contributions from Kansas State University - Gary Pierzynski, Gary Paulsen, and Gerry Posler

The Department of Agronomy at Kansas State University celebrated its Centennial in 2006. We have a long history of providing leadership for the American Society of Agronomy through a number of department heads that served as President of ASA during the period from 1906 to 1946. Albert M. TenEyck was head of the Department of Agriculture from 1902 to 1906 and became the head of the Department of Agronomy when it was created in 1906. He served as head until 1910 and was President of ASA in 1910. William M. Jardine was head of Agronomy from 1910 to 1913 and President of ASA in 1917. He went on to a distinguished career as Dean of Agriculture/Director of the Kansas Agricultural Experiment Station, President of Kansas State College, and eventually as United States Secretary of Agriculture. Leland E. Call was head of Agronomy from 1913-1925 and served as President of ASA in 1922. Similar to Jardine, Call went on to serve as Dean of Agriculture/Director of the Kansas Agricultural Experiment Station. Ray I. Throckmorton served as head of Agronomy from 1925 to 1946 and also served as Dean of Agriculture/Director of the Kansas Agricultural Experiment Station from 1946 to 1953. Throckmorton was President of ASA in 1934. Call, Jardine, and Throckmorton were honored as a namesake for a building on the campus of Kansas State University as recognition of their leadership, outstanding service, and accomplishments.

Contributions to Soil Science by Merritt F. Miller - Stephen H. Anderson, Clark J. Gantzer, and Randall J. Miles

Soil science benefited greatly from both the scientific and administrative efforts of Professor Merritt F. Miller while he served at the University of Missouri. Professor Merritt Finley Miller (1875 to 1965) was the first appointed Professor and Department Chair in 1904 of the newly formed Department of Agronomy. Professor Miller’s early work focused on evaluating cropping systems for improved crop productivity. The most significant work of

Professor Miller was the development of methods for evaluating soil erosion and new cropping systems for soil conservation. In 1915, R.W. McClure, a student, and Professor Miller measured rainfall and runoff over a two-month period in the first soil erosion experiment in the U.S. This initial work, also supported by F.L. Duley, led to the development of soil erosion plots for investigating soil loss related to cropping practices. In 1928, Hugh Hammond Bennett used these Missouri data to support his request to the U.S. Congress to obtain funds for the first 10 soil erosion experiment stations from whose data the Universal Soil Loss Equation was developed. This equation has been used to predict soil erosion and design soil conservation methods throughout the world. Professor Miller served as the Chair of the Department of Agronomy from 1904 to 1914, the Chair of the Department of Soils from 1914 to 1938, and the Dean of the College of Agriculture from 1938 to 1945. He served as President of the American Society of Agronomy in 1924. While serving as Chair of the Department of Soils, he attracted several significant soil scientists who began their careers in Missouri (with dates of service at University of Missouri): William A. Albrecht (1916-59), Richard Bradfield (1920-30), Hans Jenny (1927-36), Leonard D. Baver (1930-37), and C. Edmund Marshall (1936-76).

Marion Jacob Funchess, ASA President 1929 - Charles Mitchell

Marion Jacob Funchess was the twenty-second President of ASA and one of the first from the Deep South. A native of South Carolina and a graduate of Clemson College (now Clemson University) and the University of Wisconsin, Funchess came to work at Alabama Polytechnic Institute (now Auburn University) as an Assistant Professor of Agriculture in 1909. He was named "Professor of Agronomy" in 1915 and served as head of the department from 1920 until 1934. During his tenure, the name was changed to Department of Agronomy and Soils. Funchess formed the foundation of the College of Agriculture at Auburn University and the Alabama Agricultural Experiment Station (AAES) having served as Dean of the College and Director of the AAES for 26 years, 1924-1950. He was elected President of American Society of Agronomy in 1929. His teaching in soil fertility and his stress on getting the right information led to the nickname of "Facts Funchess". With his decisive personality, he was a strong agricultural leader grounded in the traditional view of agricultural investigation. In 1961, the largest classroom and laboratory building built on the Auburn University campus at that time was named in his honor. Today, Funchess Hall is the home to the departments of Agronomy and Soils and Horticulture and has classrooms and offices for 3 other departments.

Soils and Civilizations Session – Eric C. Brevik Presiding

On the Uses and Abuses of Soil and Water in the Historical Fertile Crescent - Daniel Hillel

The region of the Near East known as the Fertile Crescent is where humans first settled on the land and began to engage in farming and herding, starting some ten millennia ago. Consequently this region has borne the brunt of continuous exploitation longer than any other region. The impacts include widespread denudation of natural vegetation and entire biotic communities; erosion of slopes and plains; as well as silting, waterlogging, and salination of valleys. Degradation of land, along with depletion and pollution of water resources, exacerbate the region's current problems and conflicts. Yet much can be done to rectify past abuses and to restore damaged environments by means of reforestation, reseeding of rangelands, and the conservation as well as efficient management of soil, water, and biotic resources.

Soil Structure:A History from Tilth to Habitat - Benno P. Warkentin

Soil structure of surface horizons was perceived for millennia as tilth of the seed bed and plowing to achieve it. This was the concept until about 1850 while mostly practitioners wrote about soils, then the soil scientists stepped in and defined it as aggregation. The early social history of tilth was largely about the plow—how to plow well.

With the advent of soil science laboratories the dominant concern soon became measurement of static properties expected to be related to tilth and stability of structure: aggregate-size distribution, bulk density to calculate porosity, grain-size distribution, shape and size of aggregates, and stability of aggregates. It was a concept based on the solid particles. The importance of organic matter and clay content in soil structure was generally recognized. All these properties were related to cultivation, and cultivation to tilth and yield, but not close enough to allow prediction of tilth from measured properties.

By 1950 soil structure research was in the doldrums. Two major changes occurred after 1970 to reinvigorate it. The concept of hierarchical arrangement of different aggregate sizes, and the bonds responsible for stability, drew attention to different void sizes and to the soil functions of each. And then the recognition of the unique role of soil in ecosystems led to considering soil structure as defining the habitat for soil bio-physico-chemical functions such as decomposition, water routing, etc. Structure now became a concept centered on voids, and the term soil architecture became more appropriate; the spaces and surfaces of the spaces were more important than the solids of walls and roof. This is the venue for studies begun in the last decades. Today's soil structure research is again productive in concepts and applications.

Trajectories of Nitrogen Cycling in Indian Maize and Antebellum Cotton Ecosystems in the South: Some Implications - Daniel Richter, Julie DeMeester, Jianwei Li, and Jason Jackson

To compare and contrast changes in soil N cycling on decadal time scales and to learn more about sustainability of historic management regimes, N cycles were constructed for maize grown by indigenous Americans in Southern bottomlands from as early as 1200 to 500 years BP and for antebellum cotton on uplands. Although a range of N cycling exists in this historico-ecosystem analysis, both agroecosystems tend toward depletion of plant-available N.

Identification of Ancient Landforms - George J. Castille

No abstract submitted.

The Geology of the Katrina Disaster in New Orleans - Stephen A. Nelson

A combination of historical and geological factors combined with inadequate design of levees and floodwalls resulted in a series of levee overtoppings and catastrophic levee failures in the New Orleans area during the passage of Hurricane Katrina on August 29, 2005. Early in the morning of August 29, levees along the Mississippi River – Gulf

Outlet and Intracoastal Waterway were overtopped by the storm surge generated by Katrina resulting in the flooding of eastern New Orleans and St. Bernard Parish. Later in the morning storm surge entering New Orleans' Inner Harbor Navigational Canal overtopped levees and floodwalls on both sides of the canal, eventually resulting in the catastrophic failure of the floodwalls and the destruction of the Lower 9th Ward. Three drainage canals in New Orleans, originally constructed in the mid-1800s to drain rainwater from the city into Lake Ponchartrain to north, then became subject to storm surge entering from the Lake. The excess pressure of the surge combined with the weak geological material underlying the levees and floodwalls resulted in two levee breaches on the London Avenue Canal and one on the 17th St. Canal by mid-morning on August 29. These breaches resulted in flooding of about 80% of the city of New Orleans. The failures of levees on these drainage canals did not result from overtopping the floodwall system, but apparently from weaknesses in the design of the system that failed to adequately account for the underlying geologic conditions.

2006 SSSA Symposia

The SSSA Council on the History, Philosophy, and Sociology of Soil Science sponsored two symposia at the 2006 SSSA meetings in New Orleans. The first was titled "Soils and Human Health"; the second was "Pedologic Progress, Philosophy, and Perspectives".

Abstracts from the symposia are published below. Many of these presentations were recorded, and are accessible by going to https://www.acsmeetings.org/2006/

Soils and Human Health Session - Eric C. Brevik Presiding

Airborne Dust and Human Health - Brian Bossak

The link between airborne particulates and human health is coming under greater scrutiny in the modern era. Scientific evidence suggests that these particulates can be laced with organic chemicals, microbiologic pathogens, and potentially carcinogenic minerals. Recent research demonstrates significant correlations between airborne particulate concentrations and size with an increasing incidence of respiratory disorders. Desertification from anthropogenic causes and the indirect effects of climate change may result in changes to dust loads and sizing. This presentation provides a broad overview of current thinking in regards to airborne particulates, their impacts on human health, and research needs.

Feeding Animals for Soil and Human Health - Tilak R. Dhiman and Amy Ure

There has been an expanding interest among the population in organic and functional foods that promise additional human health and environmental benefits compared to their conventional counterparts. The idea of allowing animals to graze on open pasture versus feeding conserved forages and high grain diets in a confinement operation sits well with many health- and environmentally-conscious people. Dairy and meat products from grass-fed cattle have been reported to contain significantly higher concentrations of β-carotene, vitamin E, ω-3 fatty acids, conjugated linoleic acid (CLA) and vaccenic acid (VA) compared to products from cattle fed conventional diets consisting of preserved forage and high grain diets. Ground beef has been, and continues to be a common source of *E. coli* infection. Recent studies has demonstrated that as the amount of grain in the diet increased, colon pH dramatically decreased, and this led to an increase in the number of acid-resistant *E. coli* bacteria in colonic digesta. Beef cattle fed 90% grain had very large numbers of acid-resistant *E. coli* compared to high forage diets. These all lend to significant potential health benefits for humans. There is a potential niche market for these types of dairy and meat products. A functional food survey found that respondents were willing to pay an average of $0.41 more per gallon for CLA-enriched milk if health claims that it would reduce the incidence of cancer were true. In addition, they found that households with children and health-conscious consumers were the most willing to pay premium prices for such products. Clearly, the health claims made about dairy and meat products from grass-fed cattle should be further explored and substantiated.

Climate and Soils: Their Influence Upon Human Health and Society - James DeMeo

Soils and climate are major factors determining the rise of civilizations. Natural ecology, agricultural potentials and animal herding practices are affected, out of which economic activity, trade and inventiveness develops. Climatic stability maintains societies, while desertification can bring human societies down, stimulating famine, starvation, mass-migrations and culture collapse. A major climate change impacted the Old World *Saharasia* Desert Belt -- North Africa, the Middle East and Central Asia -- which prior to c.4000 BCE was a relatively well-watered savanna-grassland thick with plants and animal life, and productive soils upon which many now-vanished human societies thrived. Garamantia (North Africa), old Assyria (Middle East), and Altyn Depe (Central Asia) among others vanished under centuries-long withering droughts. Epochs of conflict developed over remnant oases and exotic rivers, with subsequent starvation-trauma, mass-deaths, conflict-aggression and social collapse. Archaeology and history shows the progressive appearance and intensification of social violence and war alongside this desertification, where hunting tools were converted into war-weaponry, and more peaceful cultures progressively were displaced or vanished as fertile conditions disappeared. As the land dried up, soils dessicated, and crops and wildlife vanished, aggressive male-dominated societies appeared. Women, who traditionally were the agriculturalists and food-gatherers, lost status. Attending malnutrition affected Infants and children dramatically, with a mild or severe psycho-neurological retardation. Human behavior and social institutions then progressively turned towards more violent modes. Social violence and war appears earliest within human history on these dessicating Saharasian landscapes, while well-watered regions most distant remained peaceful the longest. These conclusions on the origins of war developed from a systematic evaluation and mapping of global cultural, archaeological, climate and soils data. World maps indicate a strong geographical correlation between regions of hyper-arid desert and low productivity, to the most extremely patriarchal authoritarian and violent of world cultures.

Historical Evidence of Human Recognition of the Relationship between Soil Quality and Human Health - Thomas Sauer

That humans have long recognized the impact of soil quality on human nutrition and health is readily apparent in the historical records of numerous cultures. Human attitudes toward soil were shaped by their degree of understanding of how their personal survival and/or their culture's prosperity depended upon productive soils. Examples from art and literature of Mediterranean cultures, for instance, illustrate a very high regard for productive lands. Conversely, poor soils were often equated with chronic malnutrition and "weak" or inferior races. Nonetheless, such attitudes did not necessarily lead to good soil stewardship. Even the most advanced cultures were unable to enact effective measures to protect what they recognized to be a vital resource, often with dire consequences. Later, in the New World, soils were exploited, depleted, and abandoned as pioneers moved on to settle new areas. Soils suffering from physical, chemical, or biological degradation were typically described as "tired" or "exhausted", inferring an interesting parallel between human symptoms and soil condition. Even as late as the mid-20th century, farm publications urged farmers to be good stewards as "good soils = good health" implying that care for the land would result in a healthier and happier life for them and their communities. Today, increasing interest in organic food production practices and source of origin labeling are the modern manifestation of humans' recognition that soil quality affects food quality and human health.

Soils for Health: Linking Soil-Plant-Animal/Human Interrelationships at the USDA-ARS, U.S. Plant, Soil & Nutrition Laboratory – A Historical Perspective - Ross M. Welch

For millenniums many cultures have held a reverence for soils in human existence. Indeed, many cultures have believed that humans were created from soil. Many ancient philosophers suggested a cycle of human life from soil to plant/animal to human and back to soil. It was not until the mid 19th century that scientists began to study this linkage. Carl Sperngel (a German agriculturalist) noted that the nutritional value of clover was related to the soil the clover was grown on. In the United States, state geologists in the mid 19th century were the first to study the relationship of soils to animal and human health. In 1934, the USDA became very interested in studying the role of soils in human health because of a letter sent to the than Secretary of Agriculture, Henry A. Wallace, from a Professor (John Murlin) at the University of Rochester School of Medicine. His letter prompted Secretary Wallace to appoint a scientific committee to consider the role of soils in human health. The report generated by this committee ultimately resulted in the creation of the U.S. Plant, Soils & Nutrition Laboratory (PSNL) on the Cornell University campus in 1940 using federal Bankhead-Jones funding. Since PSNL's establishment, it has contributed greatly to our understanding of the roles that soils play in human health. Several important discoveries and accomplishments of this unique laboratory will be presented linking soils to human health.

Soils and Society: The Human Health Legacy of Urban Lead Contamination - Gabriel Filippelli and Mark Laidlaw

The intersection between geological sciences and human health is gaining significant interest as we understand more completely coupled biogeochemical systems. An example of such a problem largely considered solved is that of lead (Pb) poisoning. With aggressive removal of the major sources of Pb to the environment, including Pb-based paint, leaded gasoline, lead pipes and solder, the number of children in the United States affected by Pb poisoning has been reduced by 80%, down to a current level of 2%. In contrast to this national average, however, more than 16% of urban children exhibit blood Pb levels above what has been deemed “safe” (10 micrograms per deciliter); most of these are children of low socio-economic minority groups. We have analyzed the spatial relationship between Pb toxicity and metropolitan roadways several US cities and conclude that Pb contamination in soils adjacent to roadways, the cumulative residue from the combustion of leaded gasoline, is being remobilized. We have also found that seasonal trends in children’s blood lead levels seems to be controlled by exposure to lead-enriched dust originating from contaminated soils and suspended in the air when several weather related environmental conditions are present: temperature is high, soil moisture is low, and fine particulate is elevated. Under these combined weather conditions, lead-enriched dust disperses in the urban environment and is manifest by elevated lead dust loading. In this case, exposure is via increased dust loads in homes and on contact surfaces, with ingestion being the uptake mechanism. Although further work using detailed tracking of lead, possibly involving lead isotopic studies, may help to elucidate the connection between seasonality and blood lead values, these results indicate that the ability of geochemical and meteorological factors to predict blood lead supports the supposition that external loading and exposure drives much of the blood lead concentrations.

Human Contact with Plants and Soils for Health and Well-Being - Joseph Heckman

Many studies reveal that in addition to needing food and good nutrition from fertile soils, people also need contact with nature for health and well being. While active work with plants and soils engenders a sense of well-being and resultant stress reduction in the gardening public, even the passive viewing of landscapes by non-gardeners can improve human health. A classic study conducted in a hospital showed patients recovered more quickly from surgery and required less pain medication if they had a view of a green landscape rather than the view of a brick wall. Other studies reveal that walking in a garden helps cancer patients recover, and that Alzheimer’s patients exhibit fewer violent outbursts. Also, children with leaning difficulties improve in their ability to concentrate when they are moved from areas with little or no green spaces to areas of increased greenery. Beneficial effects of viewing scenes of nature, as compared to urban scenes or hardscape, can result in physiological changes such as lowering blood pressure and reduced muscle tension. Some studies suggest that levels of greenness may influence the incidence of crime. Although, the concept of designing healing landscapes at hospitals, hospices, nursing homes, and urban environments has matured into a discipline known as horticultural therapy, the healing factor of healthy landscapes has not gained the broader attention of soil scientists and agronomists in managing the earth’s land resource, even though healing landscapes are rooted in soil. Beyond food production and the usual environmental issues, soil scientists and agronomists may find new opportunities by asking and researching questions about the influence of lifeless appearing landscapes resulting from tillage, herbicides, cropping regime, and of course strip mining, on the aesthetic value of landscapes and its potential impact on the physiological and psychological health of the viewing public.

Soil Degradation and Human Health in the Lake Victoria Region of Kenya - Mary Nyasimi, Lee Burras, and Butler Lorna

Soil degradation and human health are integrally linked in rural western Kenya where perhaps as many as 80% of all homes would be classified as poor or extremely poor. This study used case studies and site analysis in order to quantify the linkages between health, poverty and soil degradation across a range of farmsteads from two communities in the River Awach watershed of Lake Victoria. Both communities are thought to have a significant HIV-AIDS population. Preliminary results indicate that a combination of gullying, nutrient depletion and other degrative processes are leading contributing causes of depressed food production, which in turn is exacerbating poor health and diminished effective land management.

Monitoring Water and Sediments in Durham, NC - L. J. Arroyo, Rakesh Malhotra, Saundra DeLauder, and Yolanda Banks-Anderson

The Environmental Risk and Impact in Communities of Color and Economically Disadvantaged Communities Project is a cooperative effort between North Carolina Central University and the US EPA National Exposure Research Laboratory in Durham, NC to assist communities address local environmental justice issues. Studies conducted across the nation indicate that low-income Hispanic and color communities live and work in urban and agricultural areas where they face potential risk of exposure to environmental toxic chemicals (EPA, 1991; NRDC, 2004). Durham community members, named Partners Against Crime (PAC), have participated in decisions about activities that may affect their environment. PAC members helped lead the study. Industrial facilities, auto recycling shops, and fetid odor coming from creeks were identified as potential risk to children and bystanders for contaminants exposure. The mismanagement of hazardous waste in junkyards facilities such as motor oil, gasoline, hydraulic oil, antifreeze, broken electrical switches, and battery acid containing heavy metals is a threat of potential contamination to surface and underground water. Furthermore, while the number of farms in NC has dropped drastically since 1970, Durham County is still economically counted as a tobacco, soybean, and maize producer. Some of those farms areas are now urbanized. Halogenated pesticides which are considered persistent organic pollutants were largely used in such crops until 1973. Water and sediments from creeks in and around the study area will be monitored in order to compile a list of contaminants of concern, and determine the potential impact on human health in these communities.

Fate and Stability of Soil-borne Arsenic in the Human Stomach - Shahida Quazi, Dibyendu Sarkar, Konstantinos Makris, and Rupali Datta

Soil ingestion by children via "hand-to-mouth" activity is the # 1 pathway of human exposure to arsenic (As) in As-contaminated residential properties. Arsenic-containing soil particles ingested by children are routed through the esophagus to the stomach where highly acidic and anaerobic conditions prevail. Such a harsh chemical environment might strongly influence the fate and stability of As-containing soil particles, leading to redox-mediated dissolution reactions. The extent to which soil-As is released into the gastric phase as well as its final oxidation state (arsenite is more toxic than arsenate) determines the magnitude of As absorption by human cells and the resulting toxicity. This study aims at understanding the fate and stability of As-containing soil particles in human stomach. We are particularly interested in evaluating potential changes in the oxidation state of As and the resulting As phases under typical gastric conditions. The human gastric phase has been simulated using the recipe provided by a widely used in-vitro gastric method (Ruby et al., 1996). In-vitro experiments to assess bioaccessible As are being conducted using (1) soluble As species (As(III), As(V), MMA, DMA), (2) crystalline and amorphous As phases (ferric arsenate, CCA-treated wood chips), (3) As contaminated soils collected from cattle dipping vat sites. Bioaccessible As is being speciated using a coupled HPLC-ICP-MS system. Seven soil samples have been obtained from former cattle dipping vat sites in Australia and five soils have been collected from Florida vat sites. Total As concentrations in these soils vary from 31 to 2143 mg kg^{-1}.

How Zinc Soil Chemistry Affects Health of People Who Eat Rice - Sarah Johnson, Jack D.C. Jacob, Roland J. Buresh, Julie Lauren, and John M. Duxbury

Zinc (Zn) deficiency is a human health concern in many parts of rice-producing Asia. Inadequate dietary intake of Zn can lead to decreased immune system function, leaving vulnerable populations more susceptible to infectious illnesses such as diarrhea and respiratory infections. In areas where people get a majority of their calories from rice consumption, increasing the amount of Zn in rice grains would contribute to mitigation of Zn deficiency-related diseases. Zinc deficiency has commonly been an agronomic problem in flooded rice production due to soil chemical changes with decreasing redox potential, which limits the availability of soil Zn for plant uptake. Even when the agronomic Zn-deficiency problems have been overcome through Zn fertilization, differences remain in plant uptake of Zn based upon crop management practices such as irrigation and residue incorporation. In a field experiment, incorporation of maize or rice residue into a flooded rice paddy resulted in a decrease in Zn uptake by rice plants in spite of soil application of 10 kg Zn ha^{-1}. In a pot experiment, treatments that raised the soil redox potential by altering water management increased Zn uptake into rice plants, even when all treatments included soil application of 14 kg Zn ha^{-1}. Understanding the effects of crop management on Zn uptake will enable assessment of the effects of agronomic recommendations on human nutrition, and will aid plant breeding programs in their efforts to enrich food crops with micronutrients in varied environments.

Albert Howard and the Limits of Science - Thomas Gieryn

Albert and Gabrielle Howard began their career as conventional scientists: doing controlled experiments and submitting their quantitative results to peer reviewed journals in soil science. However, after Gabrielle died and Albert returned from India to England, the epistemic posture of his work changed dramatically. In order to "save" his organic and holistic theories of the relationships between soil and health (against sizable professional opposition), Albert turned away from narrowly-conceived scientific evidence, and began to rely on personal testimony as an empirical means to buttress his arguments about the desirability of "whole foods."

Pedologic Progress, Philosophy, and Perspectives Session - Daniel Hirmas Presiding

Soil Science and Today's World - Are We Training Future Researchers Right? - Edward C. Runge, Kristofor Brye, Neil Smeck, Craig Rasmussen, Cristine Morgan, and Charles T. Hallmark

Scientists adhere to the scientific method as a research guide, developing hypotheses that are testable. Jenny's soil forming factors model is the most widely accepted model of pedogenesis, and is a powerful tool for conveying information to undergraduate students, but is Jenny's model suitable for testing hypotheses? Are there models that need more emphasis and might induce more curiosity and productivity from our graduates? Simonson's ordering of processes (additions, losses, translocations, transformations) improved our model set, but does not address rate of change or energy needed to produce a change. Runge and Smeck's energy model gave site-specific thought by adding renewing-upward and developing-downward vectors to the model set, but does not quantitatively predict soil change. Soil forming processes may be generalized into high energy, low frequency (HELF) events (e.g., glaciation) to low energy, high frequency (LEHF) processes (e.g., water movement). HELF events occur over geologic time, reshape the landscape, and reset soil formation. In contrast, management inputs (e.g., irrigation) result in greater biomass production by adding relatively small amounts of energy to the soil system. How will repeated LEHF inputs from water, solutes, and particulate matter affect rates and trajectory of soil formation? Will Ultisols become Alfisols or Oxisols become Inceptisols? Models presented by Jenny, Simonson, or Runge and Smeck may be able to address specific components of low and high energy events, but unable to capture the impact of both high and low energy input events on pedogenesis. Quantitative energy-bases approaches at different scales by Rasmussen and Brye may be used to predict soil properties and pedogenesis. These models represent a hybrid combination of prior models and may be the next step to provide students with a meaningful and testable approach to relevant questions in soil science.

What is new in the WRB 2006? - Erika Micheli

The first official version of the World Reference Base for Soil Resources was released at the 16th World Congress of Soil Science at Montpellier in 1998. At the same event it was also endorsed and adopted as the system for soil correlation and international communication of the International Union of Soil Sciences (IUSS). After eight years of intensive worldwide testing and data collection, the present-day state of the art, "World Reference Base for Soil Resources 2006" (WRB) has been published. This paper will present the major changes in principles and structure in the system.

Walking in Milne's Footsteps: Revisiting the Original Catena in Western Kenya - Lee Burras, Mary Nyasimi, and Lorna Butler

The catena is a fundamental concept of pedology. It ties the distribution of soils across slopes to important pedogeomorphic processes. Milne introduced and explained the term in the mid-1930's in three separate publications. These are a 1935 Soils Research article titled “Some suggested units of classification and mapping, particularly for East African soils,” a 1936 Nature article titled “Normal erosion as a factor in soil profile development,” and a 1936 book titled “A Provisional Soil Map of East Africa,” The impact and value of the catena concept is nearly immeasurable with even a major interdisciplinary journal being titled simply “Catena.” The goal of this paper is to evaluate whether the catena concept still fits Milne's original study sites in East Africa, specifically the upland regions of western Kenya. The methods used were to revisit his field sites and remap soils across the same slopes Milne explored in the 1930's. The impetus for doing this study is to evaluate whether classical pedological concepts are useful in areas such as East Africa that have undergone extensive land degradation.

Why Have Pedogenic Stonelayers (Stone-lines, Nappes de Gravats, etc.) Been Interpreted as Geogenic by So Many Geologists, Pedologists and Others? - Donald Johnson and Diana N. Johnson

Few topics in science have generated more controversy and genetic uncertainty than have stonelayers (stone-lines) in soils. The controversy has involved the fields of archaeology, geography, geology, geomorphology, ecology, pedology, soil science, sedimentology, and encompassed all continents except Antarctica. The subject has, in fact, occupied an array of Earth science literature. What is going on here? Why has such a controversy arisen? Prior to suggesting answers, we posit upfront that most stonelayers are pedogenically-produced. They are basal components of two-layered biomantles and produced by bioturbation. The term ‘stone-line' was coined in 1938 by Sharpe based on observations in South Carolina. He interpreted it abiotically, due to geogenic mass transfer slope processes. Sharpe was unaware that predecessor names had been coined in 19th and early 20th Centuries, including “pebble line”, “gravel sheet”, “cascalho”, and other names depending on language employed and country in which observations were made. He was also unaware that such features had been earlier illustrated -- in England by Darwin (in 1840, 1881), in Brazil by Hartt (in 1870), in North America by Webster and Shaler (in 1888 and 1891), and by others. Nor was Sharp aware that stonelayers had been interpreted, mistakenly, between 1898 and 1931 in the Midcontinental area as an eroded lag on soils and paleosols that became buried, and variously named “ferretto zone”, “pebble band”, “pebble concentrate”, etc. by many North American geologists (Bain, Sardeson, Calvin, Norton, Savage, Tilton, Leverett, and Kay, among others). In Brazil the stonelayer and soil above were evidence for glaciation by Agassiz and Hartt in the 1860s-70s, a view resurrected by others in the 1960s. The explanatory controversy is owed to more than a century where pedologists and soil scientists buried their heads to the obvious fact of animal bioturbation as a major force in soil formation.

Why We Treat Soil like Dirt: Stigmatization of Soil and Dirt in the Western Cultural Tradition - Claudia Hemphill Pine

Soil is often pushed to the background in public commitment to environmental conservation. This is in large part due to the unaddressed problem that in the western cultural tradition, soil is widely--if mistakenly--considered to be dirt, and dirt symbolizes the disliked. Quantitative and qualitative analyses of current mass media, college textbooks, and professional literature show the extent and area of overlap between public perception of soil and ‘dirt,' and a long-standing stigma against both of them. Until this cultural disvalue is confronted and overcome, soil study and conservation will not be supported as necessary to address increasingly critical soil environmental concerns. The roots of the cultural disvalue of soil must be uncovered to bring about change. Historical and philosophical research shows four factors contributing to identification of soil as dirt, and dirt as bad: Greek idealist philosophy spurning the disorderly material world; Christian transcendence theology equating physicality with sin; Enlightenment-era mechanistic models of the natural world, supporting a dominionistic science and environmental ethics; and modern deployment of soil and dirtiness to stigmatize subordinate social groups and the environment. Since these cultural factors evolved contingently, intervention and change are possible. Two biological factors, however, may be universals less amenable to change: human aversion to soil health risks, and cognitive tendencies toward binary thought structures that position soil and dirt in the inferior, normatively "bad" position (e.g., up[right]/down, active/passive, light/dark, ordered/heterogenous, dry/sticky, live/decomposing). Overcoming both cultural and biological disvalues of soil is best begun through conscious consideration and education on these "human dimensions," such as is already taught in wildlife, forestry, and other natural resource disciplines. Several such new approaches in environmental ethics and human sciences are outlined, which offer potential for a richer, more broadly nuanced, and positive societal value of soil.

Hydropedological Applications in the WRB: An Example from the Weatherley Catchment, South Africa - Cornelius W. Van Huyssteen, Hangsheng Lin

Soils play a dominant role in the hydrological system. Managing water supply therefore requires intimate knowledge of soils and its impact on water in the landscape. The World Reference Base (WRB) defines various reference soil groups, but these are mainly aimed at applications for arable agriculture. The purpose of this paper is to determine the feasibility of hydropedological interpretations for WRB classification, based on data from the Weatherley catchment in the northern Eastern Cape Province of South Africa. Twenty-eight soil profiles were classified based on the WRB, their water content was monitored weekly for nine years (1997-2005), and the annual duration of water saturation in each soil was calculated. One Alisol, 1 Luvisol, 2 Albeluvisols, 2 Arenosols, 3 Cambisols, 3 Lixisols, 3 Planosols, 4 Ferralsols and 9 Gleysols were identified in this catchment. Depth-weighted whole profile average annual duration of water saturation increased in the following order: Arenosols 3% ± 2% (mean ± standard error), Cambisols 20% ± 1%, Alisols 28% ± 1%, Ferralsols 28% ± 3%, Albeluvisols 35% ± 6%, Luvisols 43% ± 7%, Gleysols 55% ± 2%, Lixisols 55% ± 2%, and Planosols 57% ± 1%. Note that these soils had similar climate and vegetation within the study catchment. Our data indicated that Arenosols are excessively drained and that Gleysols, Lixisols and Planosols were continuously wet, irrespective of inter-annual rainfall variation. Water saturation in Cambisols, Alisols, Ferralsols, Albeluvisols, and Luvisols was not significantly different. Water saturation in Luvisols and Albeluvisols were highly dependent on inter-annual rainfall, wetting excessively during wet years and drying considerably during dry years, while water saturation in Cambisols, Alisols and Ferralsols seemed to be less dependent on annual rainfall variation. It appears that the WRB classification offers sufficient differentiation to allow for hydropedological interpretations. Future research should focus on the quantification of these relationships.

Historical Resources

Wilford R. Gardner Papers Available

The papers of soil physicist Wilford R. Gardner are available in the Special Collections and Archives at Utah State University. A finding aid to the collection is available at:
http://library.usu.edu/specol/manuscript/collms269.html

New Zealand Soil History

P.J. Tonkin has published "A history of soil survey and selected aspects of soil conservation in New Zealand, Parts 1 and 2" in the New Zealand Soil News. Contact Dr. Tonkin at phil.tonkin@canterbury.a.nz for copies of the articles.

New Publications

Human-induced Ecosystem and Landscape Processes Always Involve Soil Change by Dan H. Yaalon, published in the December 2007 issue of BioScience, Vol. 57 No. 11 pp 918-919. Contact Dan Yaalon at yaalon@vms.huji.ac.il for more information.

Historical evolution of soil organic matter concepts and their relationships with the fertility and sustainability of cropping systems

Raphaël J. Manlay, Christian Feller, M.J. Swift

Soil organic matter (SOM) is understood today as the non-living product of the decomposition of plant and animal substances. Because it is now recognised that SOM tightly controls many soil properties and major biogeochemical cycles its status is often taken as a strong indicator of fertility and land degradation. Nonetheless the building of the SOM concept has not been easy. A reason for this is that the SOM concept is the product of interdisciplinary cognitive production as well as of a cultural moving context. Historically, three periods involving SOM in relation to cropping sustainability can be distinguished. (1) Until 1840, some still believed that plant dry matter was mainly derived from uptake of matter supplied by SOM, which was termed humus at that time. Agriculturists who believed this based the management of cropping systems fertility on the management of humus, i.e. through organic inputs. In 1809 Thae¨r proposed a ''Humus Theory'' that remained very influential for 30 years, as well as a quantified assessment of the agro-ecological and economic sustainability of farming systems. (2) From the
1840s to the 1940s, Liebig's ''mineral nutrition theory'', progressive abandonment of recycling of nutrients between cities and country, and breakthroughs in the processes of fertilizer industry paved the way for intensive mineral fertilization as a substitute for organic practices.
Although understanding of SOM and soil biological functioning was improving it had little impact on the rise of new mineral-based cropping patterns. (3) Since the 1940s, SOM has been gaining recognition as a complex bio-organo-mineral system, and as a pivotal indicator for soil quality and agro-ecosystems fertility. This has resulted from: (a) methodological and conceptual breakthroughs in its study, leading to significant scientific developments in characterising the role of humus as an ecosystem component; (b) a growing societal demand for the assessment of the environmental cost of intensification in modern agricultural practices, which has led to growing interest in organic farming, agroforestry, conservation tillage, and the use of plant cover; (c) investigation of the potential of SOM as a sink for greenhouse

gas carbon in response to concerns about global climate change. In summary the interest in SOM over time, both from the viewpoint of scientific concept and that of field practices, can be described by a sine curve. Its definition and the recognition of its functions have gained both much from the combination of holistic and reductionist approaches and from the progressive amplification of the scale at which it has been considered.

Published in Agriculture, Ecosystems and Environment 119 (2007) 217–233. Contact Christian Feller at christian.feller@ird.fr for more information.

No-Till Farming Systems, T. Goddard, M. Zoebisch, Y. Gan, W. Ellis, A. Watson, and S. Sombatpanit (Eds). World Association of Soil and Water Conservation Special Publication No. 3.

The following excerpt is from the Forward for the book, and was written by Dennis Garrity. Go to www.waswc.org for more information on this new book.

The practice of no-tillage crop production has flourished during the last few decades. It has now been adopted in some form in most countries. Such a ubiquitous phenomenon has few precedents in modern times. The evolution of no-tillage and its adoption rate have not been linear. Progress accelerated as the breakthroughs in science and new technologies gradually accumulated.

The pioneers of no-till had a difficult time. Most were inquisitive farmers skilled in practical problem solving and mechanics, and motivated to continually initiate new avenues of exploration. They could see the rationale behind the practice and the potential benefits from its application. But equipment was limited and of inadequate design for the wide range of applications required. And their knowledge of the complex production ecology of no-till systems was very limited. However, their enthusiasm was infectious, and others increasingly joined in the quest to make no-till farming practical and profitable.

The early practitioners and researchers were challenged by weed problems and fertility management. They soon came to realize that no-till practices create a moving target. The soil's biological, physical, and chemical properties all change over time, as does the composition of weed populations. It takes time for the soil and plant system to reach a new equilibrium. Long-term research was therefore required to unravel the puzzle. However, research grants were most often short term; hence the initial results and recommendations did not always coincide with longer-term field experience. Research scientists had problems trying to represent field conditions on small plots. And no single no-till suite of recommendations fitted all areas, so farmers had to conduct localized field trials to see what worked best in their region and for their particular cropping systems.

The continued evolution of no-till farming requires the sustained enthusiasm of all involved, including farmers, extensionists and scientists. New participants need to receive proper training and education in no-till farming techniques. Support at the national level is needed for no-till to continue to develop. Crop improvement trials need to be done under no-till conditions so that crop traits important to no-till are selected for. Likewise, fertility and agronomic practices need to be conducted on no-till managed land at the plot, field, and landscape scale to encounter the full range of production ecologies.

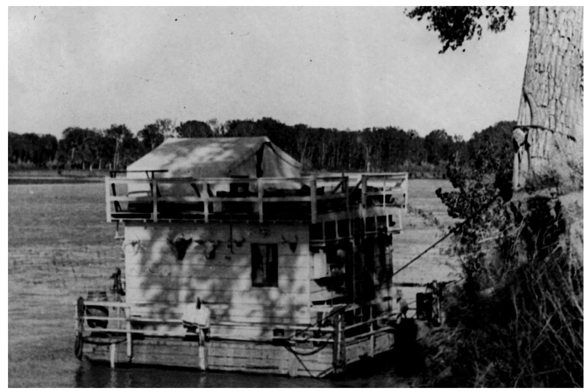
Research is venturing into new areas such as how innovative cropping systems and residue management can influence soil biological activity and nutrient cycling. Biological tillage is replacing mechanical tillage, and more attention is being given to cropping systems and agronomic practice to control weeds and replace the myopic view of 'herbicides only'. It is the responsibility of all involved in no-till to ensure that such efforts continue into the future so that no-till can be adopted on a far greater scale across the agricultural systems of the globe.

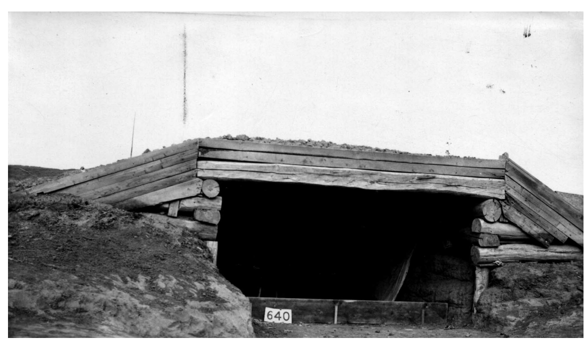
This book aims to celebrate from where no-till has come, and to advance the concept by sharing the latest information and knowledge from around the world. New frontiers and the most recent developments are discussed. One of the most significant of these is the expanding interest in how carbon accumulation in agricultural systems can both enable greater adaptation to climate change and contribute to the mitigation of greenhouse gas emissions. The carbon markets are rapidly taking note of the vast potential for no-till systems to contribute to carbon offsets, thus opening up the opportunity for progressive farmers to gain additional income for their efforts to create more sustainable and productive no-till farming.

Book Reviews

Six Months Along the Missouri, by Roy W. Simonson. Infinity Publishing, West Conshohocken, PA, USA, 2004. Paperback, 103 pp. ISBN 978-0741419361, $10.95

Six Months Along the Missouri provides an interesting and entertaining look at Roy Simonson's contributions as a soil scientist to the land appraisals that were made prior to flooding of the Fort Peck reservoir in northeastern Montana, USA, in the 1930s. This account includes information on how collection of soils information and overall land appraisals were done, the living conditions of the men working on the project, and stories of encounters with various people along the river during the course of the appraisals. The book is not particularly lengthy or expensive, and provides an excellent read for someone interested in the history of early soil survey in the United States.


The houseboat that provided primary living and lab accommodations for the men of the appraisal crew during most of the land appraisal project. (Photo courtesy of Roy Simonson)



A dugout barn that served as living quarters for the men of the appraisal crew during a portion of the Fort Peck land appraisal project. (Photo courtesy of Roy Simonson)

Eric C. Brevik

Footprints in the soil: People and ideas in soil history, by B.P. Warkentin (Ed.). Elsevier, Amsterdam, 2006. Hardbound, 572 pp. ISBN 0-444-52177-1, $75.00

Footprints in the Soil – People and Ideas in Soil History is a book that has long been awaited by the soil history, philosophy, and sociology community. Cosponsored by Commission 4.5 of the International Union of Soil Sciences and Council S205.1 of the Soil Science Society of America, *Footprints* was published for release at the 2006 World Congress of Soil Science in Philadelphia, USA. *Footprints* focuses on the history and development of soils ideas in the western world. The book has 18 chapters written by 28 authors who are experts in their field, and is subdivided into four sections of four to five chapters each. A section at the end of the book includes color versions of select figures, a nice addition when trying to communicate ideas about soil maps or thin sections.

The first section is titled "Early Understanding of Soils". Chapters address Roman and Aztec soils knowledge, a review of soils knowledge among indigenous cultures in the world's developing regions, and a look at soils and religion. There is also a chapter that looks at some famous European scientists such as Palissy, Thaer, and Darwin who are better known for work in other areas, but also included soils in their studies. The Roman and Aztec chapters have a particular strength because the authors went back to original works, working with the Latin texts or Aztec glyphs to decipher the knowledge base of the ancient cultures being discussed. I found the diagrams of Aztec glyphs with their accompanying explanations particularly interesting.

The second section focuses on "Soils as a Natural Body". One chapter explores the people and ideas that influenced Dokuchaev. Another delves into the personal clash between Hilgard and Whitney, and how the decisions of each ultimately shaped the future of soil science in the United States. Both of these chapters provide interesting insights to individuals who have had profound influences on the field. The last two chapters move from individuals to concepts. In Chapter 8, the development of soil cover patterns and soil catena concepts is treated by exploring the contributions made by scientists all over the world. The section ends with a comprehensive discussion of the development of soil geomorphology that includes Ruhe, Richmond, Morrison, Gile, etc. as well as contributions by lesser known individuals.

The third section deals with "Soil Properties and Processes" and focuses specifically on soil biology, soil chemistry, and soil physics. There is also an investigation of the interactions - or lack thereof - between soil science and ecology. The ecology chapter offers interesting observations concerning why ecologists and soil scientists should be interacting more, and encourages well-rounded training for scientists and more interdisciplinary cooperation. The three subfield chapters look at the development of ideas within their subfields. Those on soil biology and soil chemistry approach this through a discussion of some of the big names in their subfields and the contributions they made, while the soil physics chapter focuses more on two main ideas within the subfield and how they have evolved over time.

The final section is titled "Soil Utilization and Conservation", and explores the ways we have put our soil knowledge to use. It includes discussions of successes and failures. Chapters include discussions on soil erosion and conservation, soil health, nutrient management, environmental issues, and ancient terrace systems. The soil conservation chapter points out an interesting dilemma in the study of soil conservation history; soil conservation has meant different things to different people. The soil stewardship and health chapter notes that we are at a critical point in our management of global soil resources, because as we gain in production abilities through technological advancements, we also gain in our ability to degrade the soil more rapidly through techniques such as mechanical tillage. The environmental issues chapter discusses a wide range of challenges, including those from inorganic fertilizers, heavy metals, and global warming. The book concludes with a chapter on soils in ancient agricultural terraces and what they can tell us about the influence of humans on soils over long time periods.

Overall *Footprints* does an outstanding job achieving the purpose stated in the Preface, that is, it outlines soil knowledge in the western world, both the history behind our current knowledge base as well as ways that we use that knowledge. There is still a place and need for scholarly works looking at soil history and the development of ideas in other areas such as China and India. The one criticism I might offer is that much of the book is written at a high scholarly level that assumes soil science knowledge. It seems to me that one of the original stated goals for this project was to produce a work that would be read by people outside of soil science or science history. While certain chapters of *Footprints* should be of interest to select scientists in fields such as geology, geography, archeology, or ecology, on the whole I am not sure this publication will achieve the goal of reaching a broad, general audience. Significant portions of *Footprints* read like they were written by a soil scientist for a soil scientist. That criticism aside, the book represents a significant contribution to the soil history, sociology, and philosophy literature. *Footprints* will, without question, become an essential piece of any soil history library.

Eric C. Brevik

This review was published in Geoderma 139(1-2): 251-252

Upcoming Symposium Plans

2008 SSSA Symposia Plans

The 2008 SSSA meetings will be held in Houston, Texas, USA jointly with the Geological Society of America (GSA). The Council on the History, Philosophy, and Sociology of Soil Science is planning to propose one symposium titled “Historical links between soil science and geology” jointly with the GSA History of Geology Division and hopes to cosponsor another symposium with the GSA Archaeological Geology Division. If you have an interest in the first symposium please contact Tom Sauer at Tom.Sauer@ARS.USDA.GOV, Ed Landa at erlanda@usgs.gov, or wbrice+@pitt.edu. If you would like an update on the status of the potential symposium with the Archaeological Geology Division please contact Tom Sauer.

2009 SSSA Symposium Plans

Looking ahead towards the CSA-ASA-SSSA meetings (Pittsburgh, PA) in 2009, both the Committee on Organic and Sustainable Agriculture (COSA) and the S205.1 Council on History, Philosophy, and Sociology of Soil Science have expressed support for the idea of co-sponsoring a symposium on the Sociology of Organic Agriculture. With this project in mind, we can begin to think about ideas for presentations and speakers. Anyone with questions, ideas, or an interest in presenting in this session is encouraged to contact Joseph Heckman for additional information at heckman@AESOP.Rutgers.edu.

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